FEED THE FUTURE

# AGRILINKS




## Risk assessment for food safety management in Vietnam

Speaker: Hung Nguyen-Viet, *International Livestock Research Institute (ILRI) & Hanoi University of Public Health*

# Contribution

- Delia Grace
- Fred Unger
- Max Barot
- Lucy Lapar
- Dang Xuan Sinh
- Tran Tuyet Hanh
- Pham Duc Phuc
- Hoang Van Minh
- Tran Thi Ngan
- National Food Safety Risk Assessment Taskforce

ILRI CGIAR

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

Australian Government
Australian Centre for International Agricultural Research

CGIAR RESEARCH PROGRAM ON Agriculture for Nutrition and Health

CGIAR

# Outline

- Animal source food and food safety in informal markets in Vietnam
- Evidence from risk assessment for food safety: pork and fish value chains within a One health / Ecohealth context
- From food safety research to policy translation

# Food safety in Vietnam

- Food safety among the **most pressing issues** for people in Vietnam, more important than education or health care
- Vietnam has a **modern food safety legislation** system but the use of risk based approach is limited
- Risk perception towards **chemical hazards** is important
- Willing to pay 5-10% premium for food safety
- Food exports relatively well managed but **deficits in domestic markets**

# Importance of pork for food security in Vietnam

Pork is an **important component** of the Vietnamese diet

- More than 70% of consumed meat is pork, 27kg/capita/year
- 83% produced by very small or small farms
- 76% of pigs are processed in small slaughtering, nearly 30,000
- Preference for fresh "warm" pork supplied in retail

  traditional markets (80% of all pork marketed)
  - affordable, address local demands
  - often escape effective control

- Consumption of risky pork products is common (raw fermented/blood pudding)

– f

# PigRISK: Pork safety in Vietnam (2012-2017)

**Risk assessment**

- *Salmonella* risk pathways developed for producers, slaughterhouse and consumers, quantitative microbial risk assessment (QMRA) risk for consumer
- Chemical risk assessment

*Farm* → *Transportation to SH* → *Slaughterhouse* → *Retailer* → *Consumers*

- Feed in bags, remaining feeds at the cages, environment
- Liver
- Kidney
- Pork
- Consumption survey

**1275 samples** (farms, slaughterhouse, market) collected during 1 year

ILRI CGIAR

# PigRISK - microbial (*Salmonella*) contamination

| Actor | Sample type | Prev (%) |
|---|---|---|
| Producer | Drink water | 19.4 |
| Producer | Floor swab | 36.1 |
| Producer | Waste water | 38.9 |
| Slaughter house | Carcass swab | 38.9 |
| Slaughter house | Feces | 33.6 |
| Slaughter house | Mesenteric | 35.6 |
| Slaughter house | Floor swab | 22.4 |
| Slaughter house | Water | 20.4 |
| Market | Overall | 34.1 |

# Selected key results: QMRA

***Streptococcus suis*** in slaughter pigs (N=147): *S. suis* type 2, low prevalence (1.4%)

**Potential risk behaviors** such as consumption of "Tiet canh" (raw pig blood food) was common in slaughterhouse workers (43.1%)

**Cross-contamination survey** (*Salmonella*) (N=153): using the same cutting board induced the highest risk of cross-contamination with *Salmonella* (66.7%), followed by the same knife (11.1%) respectively

**Health risk by QMRA:**

-The annual incidence rate of salmonellosis: **12.6% (90% CI: 0.5 – 42.6).**

-The factors most influencing the risk: household pork **handling practice** and **prevalence in pork** sold in the market.

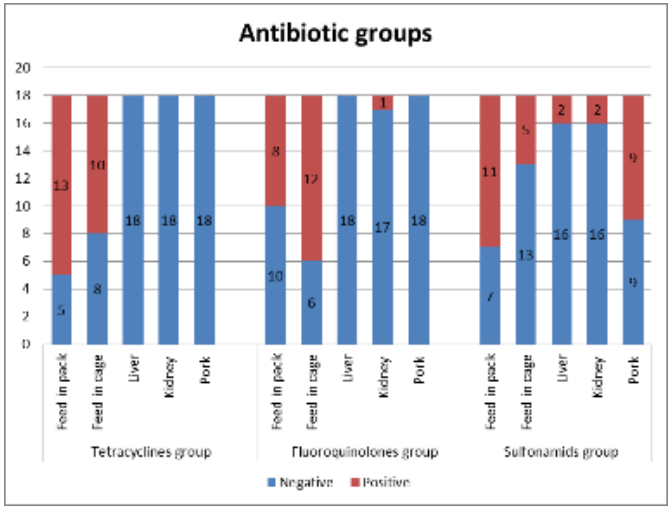
ILRI CGIAR

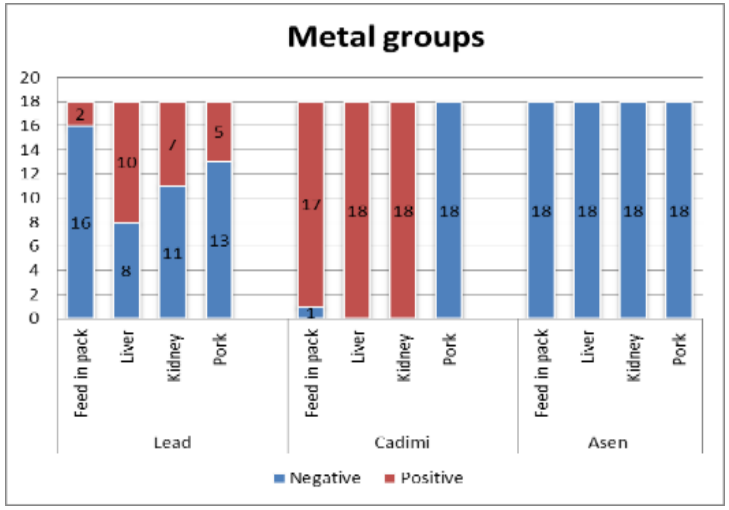
***Dang Xuan Sinh et al, 2017, IJPH***

# PigRISK - chemical hazards

514 pig feed, kidney, liver and pork samples were pooled into 18 samples were analyzed for antibiotic residues, β-agonists, and heavy metals, compared with current regulations.

Presence of banned substances (e.g. chloramphenicol and the growth promoter salbutamol in pig feed and sold pork)






*Tuyet Hanh et al, 2017, IJPH*

# Selected key results: Chemical risk assessment

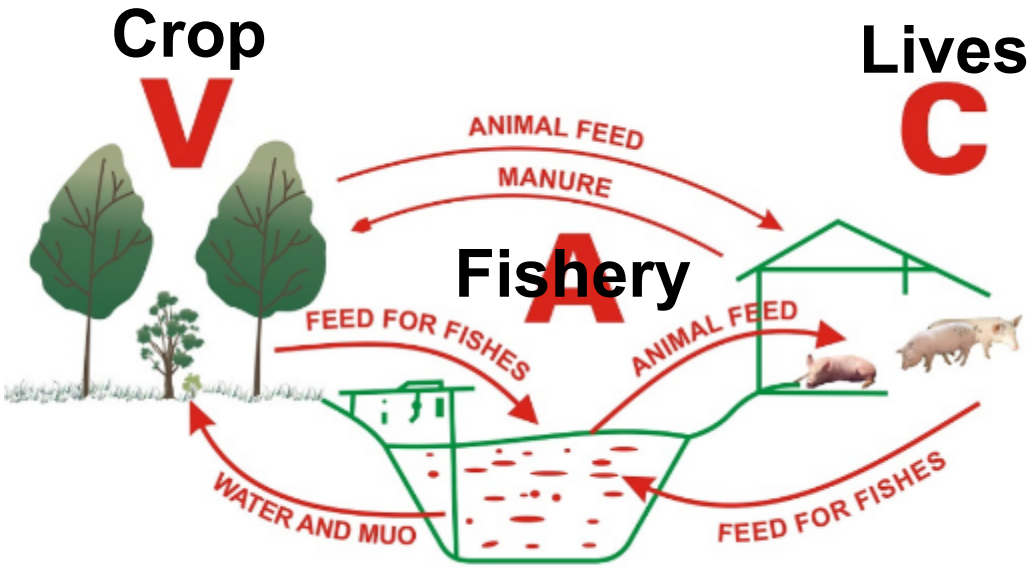
| Chemical hazards | Limit of detection (µg/kg) | Liver | | Kidney | | Meat | |
|---|---|---|---|---|---|---|---|
| | | No. positive/ *n* (%) | Residue level [mean (min–max)] µg/kg | No. positive/ *n* (%) | Residue level [mean (min–max)] µg/kg | No. positive/ *n* (%) | Residue level [mean (min–max)] µg/kg |
| Tetracyclines | 50 | 0/18 | – | 0/18 | – | 0/18 | – |
| Fluoroquinolones | 30 | 0/18 | – | 1/18 | – | 0/18 | – |
| Sulfonamides | | **2/18 (11)** | | **2/18 (11)** | | **9/18(50)** | |
| Sulfamethazine | 15 | 2 | 68 (45–91) | 1 | 87 | 5 | 155.5 (36–263) |
| Sulfaquinoxalin | 15 | 0 | – | 0 | – | 0 | – |
| Chloramphenicol | 0.15 | 0 | – | 0 | – | **3/18 (17)** | 0.54 (0.34–0.76) |
| β-agonists | | **2/18(11)** | | **0/18** | | **1/18 (5)** | |
| Salbutamol | 3 | 2 | 4.24 (2.77–5.71) | 0 | – | 1 | 1.09 |
| Clenbuterol | 3 | 0 | – | 0 | – | 0 | – |
| Heavy metals | | **18/18 (100)** | | **18/18 (100)** | | **5/18 (28)** | |
| Lead | 70 | 10/18 (55) | 117 (71–303) | 7/18 (39) | 128 (71–208) | 5 | 74 (70–79) |
| Cadmium | 10 | 18/18 (100) | 17.5 (10.4–31.6) | 18/18 (100) | 223 (126–383) | 0 | – |
| Arsenic | 50 | 0 | – | 0 | – | 0 | – |

Most of samples: negative or did not exceed current MRL

ILRI CGIAR

*Tuyet Hanh et al, 2017, IJPH*

# Contaminated fish and health risk in an integrated agriculture system




**Health and environmental issues & livestock?**

Nguyen-Viet et al, 2014

ILRI CGIAR

# Risk assessment: fish from wastewater in Hanam province

- Wastewater from Hanoi and sanitation system → canal → fish contaminated by heavy metal and pathogens → health risk
- Conducting a risk assessment of tapalia



ILRI CGIAR

Toan et al (2014)

# Risk assessment: fish from wastewater in Hanam province

- Tilapia from Nhue river.
- Highly contaminated Pb level, but low risk for tilapia
- Local people seem to be aware of the risk, they sell contaminated fish/vegetables to other to

| Mẫu | n | Positive (%) | | Pb (µg/kg) | Cd (µg/kg) |
|---|---|---|---|---|---|
| | | Pb | Cd | µ | µ |
| Canal water | 27 | 100 | 40,7 | 3,7 | 0,04 |
| Talapia | 27 | 100 | 96,3 | 149 | 5,6 |

| | Pb | Cd |
|---|---|---|
| NOAEL | 1,4 mg/kg/day(2) | 0,01 mg/kg/day |
| LOAEL | 0,5 mg/kg/day(2) | 3,5-7,5 mg/kg/day2) |
| MRL | 10 µg/dl(3) | 0,1 µg/kg/day |
| TDI | 25 µg/kg/week | 25 µg/kg/day |

| TDI | Talapia consumption per | |
|---|---|---|
| | Time / day | month |
| Pb (µg) | 7,8 ± 4,61 | 9,7 ± 5,76 |
| Cd (µg) | 0,35 ± 0,206 | 1,88 ± 1,113 |

ILRI CGIAR

Toan et al (2014)

# Key messages from pork and fish risk assessment

- "One Health" food safety risk assessment
- Risk misperception: what people worry about and what makes them sick are not the same
    - Chemical risk is low in both pork and fish
    - *Salmonella* risk is high (annual incidence rate of salmonellosis was estimated to be 12.6%)
- The factors most influencing the estimate were household pork handling practice followed by prevalence in pork sold in the central market.

# Policy translation: food safety

2011 Meeting with VFA, Photo: CENPHER

2012 Meeting with DAH
Photo: CENPHER


2016

Meeting with Deputy Prime Minister Vietnam, 2 Dec 2016 (Photo: Tuyet Hanh)

# Top Takeaways

1. Pork and fish are important for Vietnamese diet. Balance between formal and “wet/traditional” markets
2. Risk assessment: useful tool for food safety management but adaptation and capacity are needed
3. Risk misperception: what people worry about and what makes them sick are not the same
4. Control & command approaches don’t work but solutions based on working with the informal sector more promising
5. Food safety policy influence: persistence, opportunistic and time sensitive